Amendments to the Specification:

Please amend the specification as follows:

A substitute specification with a marked-up version is being submitted (starting on the next page) for the Examiner's consideration. A clean copy of the specification is included for the Examiner's consideration.

SUBSTITUTE SPECIFICATION
(Clean Version)

**METHOD OF MONITORING FOR AVAILABILITY OF A SYSTEM
FUNCTION IN A COMPUTER SYSTEM**

BACKGROUND OF THE INVENTION

Field of the Invention

[0001]   The invention relates to a method and respective component and system for monitoring the availability of a system function when a change in the state of a component of the system has taken place or is intended.

Description of the Related Art

[0002]   Previously, digital switching system (e.g., the systems EWSD and EWSX from Siemens AG) contained no function which monitored particular functionalities distributed over a large number of hardware (HW) units (platforms). This created the following technical problems:

[0003]   If HW units were no longer active on account of errors (Hardware HW or software SW), the operator himself had to deduce which functionalities of the system had been lost.

[0004]   Routine tests on HW units meant that there was the possibility that particular functionalities were no longer available, since HW units were automatically disconnected during routine tests.

[0005]   An operator was able to deactivate HW units without receiving any indication of which functionalities of the system would be lost as a result of the deactivation.

[0006]   Of the problems indicated above, only the first has been partially solved:

[0007] Detection of whether a particular functionality is not available in the system was provided exclusively during the startup phase (in EWSD: adjudgement of #7 total failure).

[0008] Upon adjudgement of #7 total failure, initiation of a recovery escalation.

Drawbacks of this solution:

[0009] During normal operation, there is, to date, no direct adjudgement of or monitoring for loss of an important system function.

[0010] There is also no predictive assessment of whether a fundamental system function will be lost on account of an HW configuration.

SUMMARY OF THE INVENTION

[0011] The invention is based on the object of overcoming the aforementioned drawbacks.

[0012] This object is achieved by a method of monitoring for availability of a system function in a computer system, comprising the steps of storing, in a database of said computer system, for a system function monitored for availability, respective information which describes conditions under which said availability of a system function are to be assessed as existing or no longer existing; and utilizing said information, when a change in a state of a component of said computer system has taken place or is intended to take place, to assess whether said change that has taken place results, or said change that is intended to take place would result, in a change in terms of the availability of said system function.

[0013] According to the invention, an arbitrary system functionality indicated by the network operator is mapped in the database using the data types and the loading types of the HW units. The mapped data are provided with a functional state, are maintained and are assessed on the basis of the system state (including predictively).

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The invention in explained in more detail below with reference to the drawings.

[0015] Figure 1 is a block diagram showing a general association between data types and HW units; and

[0016] Figure 2 is a data structure diagram illustrating data types that may be available on various HW units MP-Dep.

[0017] Figure 3 is a block diagram of software for monitoring for availability of a system function in a computer system, using data illustrated in Figure 1.

[0018] Figure 4 is a block diagram of illustrating an exemplary embodiment of a computer system for monitoring for availability of a system function.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Figures 1, 3 and 4 illustrates the entire system having a functionalities in subsystem 1 (with data types A and B) and subsystem 2 (with data types C and D). Platform x is shown having both data types A and B, and platforms y and z having only data type A and B respectively.

[0020] The following (operator-related) data types exist on the systems EWSD and EWSX:

[0021] CALLP   (Data for call processing operations)

[0022]   CM   (Data for call processing operations)

[0023]   SLT   (Data for #7 signaling and other signaling types)

[0024]   SM   (Data for #7 signaling)

[0025]   PNNI   (Data for private networks)

[0026]   MN   (Data for mobile radio)

[0027]   PD   (Data for mobile radio)

[0028]   LIC   (Data for a line termination)

[0029]   Examples are illustrated in Figure 2.

[0030]   In addition to the data types mentioned, the loading type of an HW unit determines whether or not this HW unit is relevant in the context of total failure. Thus, by way of example, the data type SLT is used on the basis of its loading type, i.e., all MP-Deps having the data type SLT hold the same data. The loading type is used to decide which processes ultimately access these data and process them.

[0031]   The combination of data type and loading type stipulates what functionality is provided by a particular HW unit. Thus, an MP-Dep having the data type SLT may or may not be relevant to #7 signaling, depending on the loading type. To illustrate more simplistically, the designation #7-SLT is used below when the loading type of the MP-Dep means that it is relevant to #7 signaling. Otherwise, just the designation SLT is used.

[0032]   If, by way of example, the system functions "call processing" and "#7 signaling" have now been assessed as being relevant in the context of total failure, the check on the availability of the call processing functionality needs to be assured of the availability of at least one MP-Dep from the seat [MP-Dep 1x and MP-Dep 2x] in the example in Figure 2. For the #7 functionality, the MP-Deps 1x, 2x and the MP-Dep 40 need to be checked.

[0033]   Since the network operator would usually wish to define the instant at which system functions are to be assessed as relevant to failure, the aforementioned check must be of flexible design. This is achieved as follows:

[0034]   The components (HW units) of the system are mapped in the database,

[0035]   for a mapped component, a respective record is made of whether, on the basis of its data and loading type, this component is necessary for one or more system functions which are relevant in the context of failure (the details required for making the aforementioned record can be prescribed by a network operator, for example),

[0036]   for a component mapped in this way, an additional record is made of the instant (e.g., during startup, after startup, or at any time) at which this component is necessary (the details required for making the aforementioned record can likewise be prescribed by a network operator),

[0037]   for each system function, the minimum number of the mapped components which are needed to maintain this very system function is also stipulated,

[0038]   for a mapped component, its respective (functional) state is also recorded, i.e., whether or not it is active,

[0039]   this state (active/not active) is maintained by the maintenance SW already existing for this purpose,

[0040]   any change in a state is reported to a total failure detection unit,

[0041]   in this context, this report may be sent before or after a change in a state,

[0042]   if this report is sent before the change in a state (e.g., if an operator wants to deactivate components, e.g., HW units, or if a routine test is to be carried out), the total failure detection unit assesses whether deactivating a particular component would result in a particular system function being lost, and notifies the report originator (e.g., maintenance SW, etc.) of this fact,

[0043]   if this message is sent after the change in a state (e.g., when a component fails), the total failure detection unit assesses whether deactivation of a unit has caused a particular system function to be lost. The result of this assessment is forwarded to the report originator (e.g., protective SW),

[0044]   the report originator can now react in the manner which it deems appropriate (alarm, rejection of the operator order, rejection of the routine test (which would result in the unit being disconnected), repetition of startup, etc.).

[0045]   The above-described method and component are illustrative of the principles of the present invention. Numerous modifications and adaptations will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

SUBSTITUTE SPECIFICATION

<u>ABSTRACT</u>

[0046]   To date, digital switching systems have contained no function which monitored particular system functions distributed over a large number of different hardware units. The invention maps any desired system function indicated by the network operator in the database using the data types and the loading types of the hardware units. The mapped data are provided with a functional state, are maintained, and are assessed on the basis of the system state (including predictively).

(Clean Version of Claims)

3.   A method of monitoring for availability of a system function in a computer system, the method comprising the steps of:

mapping of a computer system component in a database of the computer system;

recording for the computer system component whether the component is necessary for at least one system function, and, if so, for which system function the computer system function is monitored for availability;

maintaining for a mapped computer system component, a state of such component; and

using, when a change in the state of the computer system component has taken place_the recorded data to assess whether the availability of the computer system function monitored for availability changes or would change as a result of the change of the state of the component.

6.   A computer system to monitor availability of a component in the computer system, the computer system comprising:

a mapping means mapping components of a computer system to a database of the computer system;

a recording means recording for a mapped component whether the component is necessary for a computer system function, which functions are monitored for availability in the computer system;

a maintenance means maintaining for a mapped component, the state of such component, and

a total failure detection means using, when a change in the state of the computer system component has taken the recorded data to assess whether the availability of the computer system function monitored for availability has changed or would change as a result of the change of the state of the component.

11.   The method as claimed in claim 3, further comprising the step of:

recording for each mapped component the instant at which said component is

necessary.

12.   A computer system as claimed in claim 6, further comprising said recording

means recording for each mapped component the instant at which said component is

necessary.